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RELATIVE EFFECTIVENESS OF McCORMACK AND YAGER TAXONOMY AND BLOOM'S TAXONOMY IN TEACHING PHYSICS AT SECONDARY LEVEL STUDENTS IN KANNUR DISTRICT

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ABSTRACT

This article discusses the relative effectiveness of McCormack and Yager Taxonomy and Bloom's Taxonomy in teaching physics at secondary level students in Kannur district. The study was conducted on a sample of 70 students in standard VIII drawn by simple random sampling technique. Achievement test developed by the investigator on McCormack and Yager Taxonomy and Bloom's Taxonomy was used for the study. Result shows that teaching of physics using McCormack and Yager Taxonomy helped to enhance Achievement in physics of secondary school students.

Introduction

Physics is an essential part of science. The purpose of physics teaching is not only to enable the students to grasp systematically the basic knowledge of physics need for further study of science and technology, but also to unsettle the mind of young and inflame their intellect. Physics learning helps students in thinking and to satisfy the basic urge of curiosity and creativity and the insight obtained from scientific process develops intellectual honesty, positive attitudes, social skills etc.

McCormack and Yager (1989) developed a new 'Taxonomy of science Education' that broadens the view of science education beyond the two domains of content and process. The domains which come under McCormack and Yager Taxonomy are Knowledge domain, Process domain, Creativity domain, Attitudinal Domain and Application Domain. Bloom's Taxonomy is a classification of learning objectives within education proposed in 1956 by a committee of educators chaired by Dr. Benjamin S .Bloom. It refers to a classification of different objectives that educators set for students. Bloom's Taxonomy divides educational objectives into three domains: Cognitive, Affective and Psychomotor domains.

Physics is the fundamental of the all science subject and physicist want to understand how things work in the deepest and detailed level. But usually students do not understand and are not encouraged to understand the coherent structure of physics. It is the lack of this understanding that makes physics traditionally difficult and decrease the level of students confidence. Physics is only learned through a disciplined and systematic approach. Teaching of physics should not be done only through discussion, lecturing, and demonstration, but should be carried out in a problem solving and decision making environment.

For the development of technology the quality of physics education is highly essential. Physics have a very high status in the school curriculum. Physics is an important branch of science which leaves a long lasting impact in scientific field. There are lot of studies conducted to check the effectiveness of different taxonomies in science especially in physics. This study helps to understand the relative effectiveness of McCormack and Yager Taxonomy and Bloom's Taxonomy in teaching of science especially physics.

Statement of the problem

Relative effectiveness of Mccormack and Yager Taxonomy and Bloom's Taxonomy in teaching Physics at Secondary Level Students in Kannur District.

Objectives of the study

1. To find out the Achievement in Physics using McCormack and Yager Taxonomy and Bloom's Taxonomy.

2. To compare the Achievement in Physics using McCormack and Yager Taxonomy and Bloom's Taxonomy.

Hypotheses of the study

1. There exist a significant difference in the Achievement in Physics using McCormack and Yager Taxonomy and Bloom's Taxonomy.

Methodology in brief

The methodology adopted in the present study has been briefly described below.

Sample selected for the study

The present study was conducted on a sample of 70 students in standard VIII drawn by simple random sampling technique.

Tools used for the study

1. Achievement test based on McCormack and Yager Taxonomy

2. Achievement test based on Bloom's Taxonomy.

Procedure adopted for the study

The investigator adopted the pre-test post-test non equivalent group design. The study was conducted on a sample of 50 students of two divisions of standard VIII. One division was selected as experimental group and McCormack and Yager Taxonomy based teaching was used there. The other division taken as the control group and Bloom's Taxonomy based teaching was used there.

Statistical techniques used for the study

The following statistical techniques were used in the study as per its objectives:

- Descriptive Analysis
  Mean and Standard Deviation
- Inferential Analysis
  t-test

Analysis and interpretation of data

1. Achievement of the students of Physics in Experimental and Control groups

1.1 Before the experiment

A pre-test, same achievement test was administered to both experimental and control groups before starting the experiment. The pre-test scores was tabulated and the mean and standard deviation were worked out. The value of mean and standard deviation are given in Table 1.

Table 1
Mean and Standard deviation of Pre-test scores of Experimental and Control groups

Group	Number of pupils	Mean	Standard deviation
Experimental	25	9.76	3.64
Control	25	10.48	3.21

From the Table 1, the mean scores obtained for the experimental group, and control group are 9.76 and 10.48 respectively. Standard deviation for both groups is 3.64 and 3.21 respectively. This shows that both the groups do not differ significantly in the pre-test scores. This property, again, helped the investigator to make a neutral stand in the treatment process of experimentation.

1.2 After the experiment:-

A post- test was administered to both experimental and control groups after completing the lesson. The post- test scores were tabulated and the mean and standard deviation were worked out. The value of mean and standard deviation are given in Table 2

Table 2
Mean and Standard deviation of Post- test scores of Experimental and Control groups

Group	Number of pupils	Mean	Standard Deviation
Experimental	25	16.84	3.76
Control	25	13.56	3.69

From the Table 2 the mean scores obtained for the experimental group and control group are 16.84 and 13.56 respectively. Mean achievement score for the experimental group is greater than the control group. This indicated that performance of experimental group is better than control group.

2.Comparison of Physics Achievement of pupils in Experimental and Control groups, for the whole sample
The pre-test score, post- test score, and gain score of experimental group and control group were compared between the group and within the group.

2.1 Comparison of Pre-test scores of pupils in Experimental and Control groups, for the whole sample
The pre-test score of experimental group and control group were tabulated and the mean and standard deviation were worked out. The difference between the mean score of two groups was tested for significance by finding the critical ratio. The results of the test of significance are given in the Table 3

Table 3
Data and results of the significance of Pre-test scores of pupils in the Experimental and Control groups

Group	Number of pupils	Mean	SD	Critical ratio	Level of significance
Experimental	25	9.76	3.64	0.74	0.05
Control	25	10.48	3.21		

The obtained value of critical ratio 0.74 is less than z-table value, 1.96 at 0.05 level. Hence there exist no significant difference between the mean pre-test scores of two groups. The experimental group and control group are almost identical in achievement before the experiment.

2.2 Comparison of Post-test scores of pupils in the Experimental and Control groups, for the whole sample
The post-test score of experimental group and control group were tabulated and the mean and standard deviation were worked out. The difference between the mean scores of two groups was tested for the significance by finding the critical ratio. The result of the test of significance are given in the Table 4

Table 4
Data and result of the significance of Post test scores of pupils in the Experimental and Control groups

Group	Number of pupils	Mean	SD	Critical ratio	Level of significance
Experimental	25	16.84	3.76	3.12	0.05
Control	25	13.56	3.69		

The obtained critical ratio 3.12 is greater than the table value, 1.96 at 0.05 level. Hence there exists a significant difference between the mean post-test scores of two groups. The experimental group differs in the achievement after the experiment.

3 Comparison of Pre-test and Post-test scores of pupils in the Experimental and Control groups, for the whole sample
The pre-test and post-test scores of the experimental group and control group are compared within the group.

3.1 Comparison of Pre-test and Post-test scores of pupils in the Experimental group, for whole sample
The pre-test and post-test scores of experimental group were tabulated and the mean and standard deviation were worked out. The difference between the mean scores of two tests was tested for the significance by finding out the critical ratio. The results of the test of significance are given in the Table 5.

Table 5
Data and result of the significance of Pre-test and Post-test scores of the pupils in the Experimental groups

Group	Number of pupils	Mean	SD	Critical ratio	Level of significance
Pre-test	25	9.76	3.64	6.74	0.05
Post-test	25	16.84	3.76		

The obtained value of critical ratio 6.74 is greater than the tabled value, 1.96 at 0.05 level. Hence there exist a significant difference between pre-test and post-test scores of the experimental group. This indicates that achievement of students in the experimental group has improved after the experiment.

3.2 Comparison of Pre-test and Post-test scores of pupils in the Control group, for whole sample
The pre-test and post-test scores of control group were tabulated and the mean and standard deviation were worked out. The difference between the mean scores of two tests was tested for the significance by finding the critical ratio. The results of the test of significance are given in the Table 6.

Table 6
Data and result of the significance of Pre-test and Post-test scores of the pupils in the Control groups

Group	Number of pupils	Mean	SD	Critical ratio	Level of significance
Pre-test	25	10.48	3.21	3.15	0.05
Post-test	25	13.56	3.69		

The obtained value of critical ratio, 3.15 is greater than the table value, 1.96 at 0.05 level. Hence there exist a significant difference between pre-test and post-test scores of the control group. This indicates that achievement of students in the control group has improved after the experiment.

4 Comparison of gain scores of pupils in the Experimental and Control group, for whole sample
Gain scores were obtained by calculating the difference in the post and pre-test scores of each student in the two groups. The gain scores were tabulated and the mean and standard deviation were calculated. The difference between the mean scores was found out and tested for significance by finding the critical ratio. The results of the test of significance are given in the Table 7.

Table 7
Data and result of the significance of Gain scores of the pupils in the Experimental and Control groups

Group	Number of pupils	Mean	SD	Critical ratio	Level of significance
Experimental	25	7.08	2.697	5.95	0.05
Control	25	3.24	2.05		

The obtained value of critical ratio, 5.95 is greater than the tabled value, 1.96 at 0.05 level. Hence there exist a significant difference between gain scores of the students of the experimental and control group. The mean gain score of experimental group is higher than the mean score of control group. This indicates that McCormack and Yager Taxonomy is more effective than Bloom's Taxonomy.

Conclusion of the study
The findings of the study revealed that teaching of physics using McCormack and Yager Taxonomy helped to enhance Achievement in physics of secondary school students. Preparing the children to meet the demands of an uncertain future, however may require a shift in educational focus from the content to the process of learning. Not only do children need to be able to think, but they need to exercise control over their own thinking.

According to McCormack and Yager Taxonomy, students are not passing listeners and have an important place in the learning process. It take the student to a position where learning becomes a pleasant experience and also to regulate their learning process in a positive direction.

Teacher should be encourage to apply McCormack and Yager Taxonomy while teaching the subject and also teachers should be oriented to the theory and practice associated with it. At present, most of the teachers are not aware of the details of this taxonomy. Hence McCormack and Yager Taxonomy based teaching should be incorporated in the syllabus for

teacher training and provision should be made in teacher education programme to explore the possibilities of practicing innovative taxonomies such as McCormack and Yager Taxonomy.

This taxonomy of teaching gives teachers enough freedom to choose activities and materials of varying forms and this helps in planning class-room activities according to the needs an interest of the pupil. By using such taxonomy, teachers can improve the knowledge and understanding of the students in science subjects. Even in the absence of the teachers, this types of programme can engage the students and prevent the wastage of their time.

Faculty improvement programmes namely orientation classes, refresher courses, seminars and workshops should be organized for the teachers familiarize with various aspects of McCormack and Yager Taxonomy. The study further points out the need for providing opportunities to the teachers for getting trained in the use of modern technological devices like computers and internet, so as to implement interactive and creative strategies in the classroom. Modern lesson transcripts strictly following McCormack and Yager Taxonomy shall be prepared by team of expert and made available to teachers so that teachers can apply this taxonomy in the classroom setting. The result of the present study have very significant value in the field of education. The findings of the study can bring about revolutionary changes from the perspective of the learner, the teacher, the educational system and the society at large.

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